

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-23 canceled.

24. (Currently Amended) A garment or material thereof for metabolic cooling and for insulation of a user in at least a cold ambient environment below a phase transition temperature of a thermal storage material, comprising:

a buffering thermal storage material capable of storing thermal energy as the latent heat of phase change located in the garment or material thereof;

said thermal storage material comprising a phase change material having at least one actual phase transition temperature between 41.9 and 80.6 degrees Fahrenheit; and

said thermal storage material having a thermal mass ~~at least equal to a difference between a minimum heat loss from the thermal storage material to the ambient environment at a temperature below the actual phase transition temperature of the phase change material and a maximum metabolic heat absorbed by the thermal storage material for at least one hour of the phase change material at least equivalent to a thermal loading of the phase change material of 12.33 BTU per cubic foot of the garment or material thereof.~~

25. (Currently Amended) The garment or material thereof of claim 24, wherein:

said thermal storage material comprises a mixture of at least two phase change materials having at least two different transition temperatures; or

said thermal storage material comprises at least two layers of phase change materials with different transition temperatures.

26. (Currently Amended) The garment or material thereof of claim 24, wherein said phase change material undergoes a solid-solid transition or a solid-liquid transition.

27. (Currently Amended) The garment or material thereof of claim 24, wherein said thermal storage material comprises a phase change material absorbed in particles of a superabsorbent material.

28. (Currently Amended) The garment or material thereof of claim 24, wherein said phase change material is micro encapsulated.

29. (Currently Amended) The garment or material thereof of claim 24, wherein said phase change material is encapsulated.

30. (Currently Amended) The garment or material thereof of claim 24, wherein said phase change material is in pellets.

31. (Currently Amended) The garment or material thereof of claim 24, wherein said phase change material is contained in a cellulose matrix.

32. (Currently Amended) The garment or material thereof of claim 24, further comprising a thermal control layer located on a first side of said thermal storage material adapted to face a wearer and an insulative layer located on a second side of said thermal storage material adapted to face the ambient environment, said insulative layer being of greater insulative value than said thermal control layer.

33. (Currently Amended) The garment or material thereof of claim ~~32~~ 24, wherein the insulative layer comprises a semipermeable membrane which is permeable to water vapor but impermeable to liquid water.

34. (Currently Amended) The garment or material thereof of claim 24, wherein said garment comprises an article of clothing.

35. (Currently Amended) The garment or material thereof of claim 34, wherein said article of clothing is selected from the group consisting of a shirt, a jacket, trousers, a blanket, a gaiter, a facial mask, a hat and an earmuff.

36. (Currently Amended) The garment or material thereof of claim 34, wherein said article of clothing is in the form of a removable liner configured to be worn in combination with other clothing.

37. (Currently Amended) The garment or material thereof of claim 34, wherein said article of clothing comprises a diver's wetsuit.

38. (Currently Amended) The garment or material thereof of claim 34, wherein said thermal storage material is contained within closed internal spaces of the article of clothing or is incorporated into a fabric of the article of clothing.

39. (Currently Amended) The garment or material thereof of claim 24, wherein said garment comprises an article of footwear.

40. (Currently Amended) The garment or material thereof of claim 39, wherein said article of footwear comprises a ski boot.

41. (Currently Amended) The garment or material thereof of claim 39, wherein said article of footwear comprises a shoe.

42. (Currently Amended) The garment or material thereof of claim 39, wherein said article of footwear comprises a ski boot liner, a sock or a removable liner configured to be worn in combination with other footwear.

43. (Currently Amended) The garment or material thereof of claim 39, wherein said phase change material is enclosed in internal spaces within said footwear.

44. (Currently Amended) The garment or material thereof of claim 24, wherein said thermal storage material has a thermal mass at least equal to a difference between a heat loss from the thermal storage material to the ambient environment below the actual phase transition temperature of the thermal storage material and a metabolic heat absorbed by the thermal storage material for about four to about nine hours.

45. (Currently Amended) The garment or material thereof of claim 24, wherein said phase change material comprises an organic material.

46. (Currently Amended) The garment or material thereof of claim 24, wherein at least one said phase change material has an actual phase transition temperature in a range from 41.9 degrees Fahrenheit to 71.1 degrees Fahrenheit.

47. (Currently Amended) The garment or material thereof of claim 24, wherein said thermal storage material has a thermal loading of phase change material from 1.22 ~~1.34~~ BTU to 94.03 BTU per square foot of a surface area of the garment.

48. (Currently Amended) The garment or material thereof of claim 47, wherein said thermal storage material has a thermal loading of phase change material from 10.3 BTU to 46.67 BTU per square foot of a surface area of the garment.

49. (Currently Amended) The garment or material thereof of claim 47, wherein said thermal storage material has a thermal loading of phase change material from 1.22 ~~1.34~~ BTU per square foot to 10.3 BTU per square foot of a surface area of the garment.

50. (Currently Amended) A garment or material thereof for metabolic cooling and for insulation of a user in at least a cold ambient environment below a phase transition temperature of a thermal storage material, comprising:

a thermal capacitor comprising a buffering thermal storage material capable of storing thermal energy as the latent heat of phase change located in the garment or material thereof;

said thermal storage material comprising a phase change material having at least one actual phase transition temperature between 41.9 and 80.6 degrees Fahrenheit;

said thermal storage material having a thermal mass sufficient to partially decouple a heat transfer between the ambient environment and the thermal capacitor and a heat transfer of metabolic heat absorbed by the thermal capacitor; and

~~the thermal mass of the thermal storage material and the phase transition temperature of the phase change material are sufficient to maintain the phase change material in a partially solid and partially liquid state for at least one hour when the thermal capacitor is exposed to an ambient environment below the actual phase transition temperature of the phase change material from one side and to metabolic heat from another side~~ said thermal storage material having a thermal mass of the phase change material at least equivalent to a thermal loading of the phase change material of 0.82 BTU.

51. (Currently Amended) The garment or material thereof of claim 50, further comprising a thermal control layer located on a first side of said thermal storage material adapted to face a wearer and an insulative layer located on a second side of said thermal storage material adapted to face the ambient environment, said insulative layer being of greater insulative value than said thermal control layer.

52. (Currently Amended) The garment or material thereof of claim 50, wherein said garment comprises an article of clothing.

53. (Currently Amended) The garment or material thereof of claim 50, wherein said garment comprises an article of footwear.

54. (Currently Amended) The garment or material thereof of claim 50, wherein at least one phase change material has an actual phase transition temperature in a range from 41.9 degrees Fahrenheit to 71.1 degrees Fahrenheit.

55. (Currently Amended) The garment of claim 50, wherein said thermal storage material has a thermal loading of phase change material from 1.22 ~~1.34~~ BTU to 94.03 BTU per square foot of a surface area of the garment or material thereof.

56. (Currently Amended) The garment or material thereof of claim 50, wherein the thermal mass of the thermal storage material and the phase transition temperature of the phase change material are sufficient to maintain the phase change material in the partially solid and partially liquid state for about four to about nine hours when the thermal capacitor is exposed to the ambient environment below the phase transition temperature of the phase change material from one side and to metabolic heat from another side.

57. (Currently Amended) The garment or material thereof of claim 50, wherein heat transfer between the ambient environment and the thermal capacitor induces a liquid to solid transition in the phase change material while the heat transfer of metabolic heat induces a solid to liquid transition to maintain the phase change material in the partially solid and partially liquid state.

58. (Currently Amended) The garment or material thereof of claim 50, wherein said phase change material comprises an organic material.

59. (Currently Amended) An article of footwear for metabolic cooling and for insulation of a user in at least a cold ambient environment below a phase transition temperature of a thermal storage material, comprising:

a buffering thermal storage material capable of storing thermal energy as a latent heat of phase change located in the article of footwear;

said thermal storage material comprising a phase change material having at least one actual phase transition temperature between 41.9 and 80.6 degrees Fahrenheit; and

said thermal storage material having a thermal mass of the phase change material at least equivalent to a thermal loading of the phase change material of 12.33 BTU per cubic foot of the article. ~~at least equal to a difference between a minimum heat loss from the thermal storage~~

~~material to the ambient environment at a temperature below the actual phase transition temperature of the phase change material and a maximum metabolic heat absorbed by the thermal storage material for at least one hour~~

60. (Previously Presented) The article of footwear of claim 59, wherein:
said thermal storage material has a thermal mass at least equal to a difference between a minimum heat loss from the thermal storage material to the ambient environment at a temperature below the actual phase transition temperature of the phase change material and a maximum metabolic heat absorbed by the thermal storage material for about four to about nine hours; and
said phase change material comprises an organic material.

61. (Currently Amended) A garment or material thereof for metabolic cooling and for insulation of a user in a cold ambient environment below a phase transition temperature of a thermal storage material, comprising:
a buffering thermal storage material capable of storing thermal energy as the latent heat of phase change located in the garment or material thereof;
said thermal storage material comprising a phase change material having at least one actual phase transition temperature between 41.9 and 80.6 degrees Fahrenheit; and
said thermal storage material has a thermal loading of phase change material from 1.22 ~~1.34~~ BTU to 94.03 BTU per square foot of a surface area of the garment or material thereof.

62. (Currently Amended) The garment or material thereof of claim 61, wherein:
at least one phase change material has an actual phase transition temperature in a range from 41.9 degrees Fahrenheit to 71.1 degrees Fahrenheit; and
said thermal storage material has a thermal loading of phase change material from 10.3 BTU to 46.67 BTU per square foot of a surface area of the garment or material thereof.

63. (Currently Amended) The garment or material thereof of claim 61, wherein said thermal storage material has a thermal loading of phase change material from 1.22 ~~1.34~~ BTU per square foot to 10.3 BTU per square foot of a surface area of the garment or material thereof.

64. (Currently Amended) The garment or material thereof of claim 61, wherein:
at least one phase change material has an actual phase transition temperature in a range from 41.9 degrees Fahrenheit to 71.1 degrees Fahrenheit; and
said thermal storage material has a thermal loading of phase change material from 1.22 ~~1.34~~ BTU per square foot to 10.3 BTU per square foot of a surface area of the garment or material thereof.

65. (Currently Amended) The garment or material thereof of claim 61, wherein the thermal storage material comprises an aggregate of phase change material particles incorporated into a bonding material.

66. (Currently Amended) The garment or material thereof of claim 61, wherein the thermal storage material comprises a dispersion of a phase change material in a ~~sprayed-on sheet~~ of coating material.

67. (Currently Amended) The garment or material thereof of claim 61, wherein the thermal storage material comprises a dispersion of a phase change material that was incorporated into a paste while in a liquid state during lamination.

68. (Currently Amended) The garment or material thereof of claim 61, further comprising a wicking element located in the garment or material thereof.

69. (Currently Amended) An article of bedding for metabolic cooling and for insulation of a user in an ambient environment, comprising:
a buffering thermal storage material capable of storing thermal energy as the latent heat of phase change located in the article ~~garment~~;

said thermal storage material comprising a phase change material having at least one actual phase transition temperature between 41.9 and 80.6 degrees Fahrenheit; and

said thermal storage material has a thermal loading of phase change material from 1.22 ~~1.34~~ BTU to ~~94.03~~ 840 BTU per square foot of a surface area of the article ~~garment~~.

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70. (Currently Amended) The ~~garment~~ article of claim 69, wherein:

at least one phase change material has an actual phase transition temperature in a range from 41.9 degrees Fahrenheit to 71.1 degrees Fahrenheit; and

said thermal storage material has a thermal loading of phase change material from 1.22 ~~1.34~~ BTU to 10.3 BTU per square foot of a surface area of the garment.

71. (New) The garment or material thereof of claim 24, wherein the thermal storage material has a thermal loading of phase change material from 0.82 BTU to 840 BTU.

72. (New) The garment or material thereof of claim 71, wherein the thermal storage material has a thermal loading of the phase change material from 0.82 BTU to 6.87 BTU.

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73. (New) The garment or material thereof of claim 71, wherein the thermal storage material has a thermal loading of the phase change material from 6.87 BTU to 19.9 BTU.

74. (New) The garment or material thereof of claim 71, wherein the thermal storage material has a thermal loading of the phase change material from 19.9 BTU to 63 BTU.

75. (New) The garment or material thereof of claim 71, wherein the thermal storage material has a thermal loading of the phase change material from 63 BTU to 210 BTU.

76. (New) The garment or material thereof of claim 24, wherein the thermal storage material has a thermal loading of the phase change material of 12.33 BTU to 4480 BTU to per cubic foot of the garment.

77. (New) The garment or material thereof of claim 76, wherein the thermal storage material has a thermal loading of the phase change material of 12.33 BTU to 104.08 BTU to per cubic foot of the garment or material thereof.

78. (New) The garment or material thereof of claim 76, wherein the thermal storage material has a thermal loading of the phase change material of 104.08 BTU to 300.13 BTU to per cubic foot of the garment or material thereof.

79. (New) The garment or material thereof of claim 76, wherein the thermal storage material has a thermal loading of the phase change material of 300.13 BTU to 784.7 BTU per cubic foot of the garment or material thereof.

80. (New) The garment or material thereof of claim 76, wherein the thermal storage material has a thermal loading of the phase change material of 784.7 BTU to 1120.08 BTU per cubic foot of the garment or material thereof.

81. (New) The garment or material thereof of claim 76, wherein the thermal storage material has a thermal loading of the phase change material of 1120.08 BTU to 4480 BTU per cubic foot of the garment or material thereof.

82. (New) The garment or material thereof of claim 24, wherein the thermal storage material has a thermal mass at least equal to a difference between a minimum heat loss from the thermal storage material to the ambient environment at a temperature below the actual phase transition temperature of the phase change material and a maximum metabolic heat absorbed by the thermal storage material for at least one hour.

83. (New) The garment or material thereof of claim 50, wherein the thermal mass of the thermal storage material and the phase transition temperature of the phase change material are sufficient to maintain the phase change material in a partially solid and partially liquid state for at least one hour when the thermal capacitor is exposed to an ambient environment below the actual

phase transition temperature of the phase change material from one side and to metabolic heat from another side.

84. (New) The garment or material thereof of claim 56, wherein the thermal mass of the thermal storage material is equivalent to a thermal loading of the phase change material from 4.88 to 12.06 BTU per square foot of surface area of the garment or material thereof.

85. (New) The garment or material thereof of claim 50, wherein the thermal storage material has a thermal loading of the phase change material from 0.82 BTU to 840 BTU.

86. (New) The garment or material thereof of claim 85, wherein the thermal storage material has a thermal loading of the phase change material from 0.82 BTU to 19.9 BTU.

87. (New) The article of footwear of claim 59 wherein the thermal storage material has a thermal loading of the phase change material of 12.33 BTU to 1120.08 BTU per cubic foot of the article.

88. (New) The garment or material thereof of claim 61, wherein the thermal storage material has a thermal loading of the phase change material from 0.82 BTU to 840 BTU.

89. (New) The garment or material thereof of claim 88, wherein the thermal storage material has a thermal loading of the phase change material from 0.82 BTU to 19.9 BTU.

90. (New) The garment or material thereof of claim 88, wherein the thermal storage material has a thermal loading of the phase change material from 19.9 BTU to 63 BTU.

91. (New) The garment or material thereof of claim 61, wherein the thermal storage material has a thermal loading of the phase change material of 12.33 BTU to 4480 BTU per cubic foot of the garment or material thereof.

92. (New) The garment or material thereof of claim 91, wherein the thermal storage material has a thermal loading of the phase change material of 12.33 BTU to 300.13 BTU per cubic foot of the garment or material thereof.

93. (New) The article of claim 69, wherein the thermal storage material has a thermal loading of the phase change material from 0.82 BTU to 19.9 BTU and a thermal loading of the phase change material of 12.33 BTU to 4480 BTU to per cubic foot of the article.

94. (New) The article of claim 93, wherein the thermal storage material has a thermal loading of the phase change material from 0.82 BTU to 840 BTU and a thermal loading of the phase change material of 12.33 BTU to 313.13 BTU to per cubic foot of the article.

95. (New) The article of claim 69, wherein:
at least one phase change material has an actual phase transition temperature in a range from 41.9 degrees Fahrenheit to 80.6 degrees Fahrenheit; and
said thermal storage material has a thermal loading of phase change material from 1.22 BTU to 94.03 BTU per square foot of a surface area of the article.

96. (New) The garment or material thereof of claim 71, wherein the thermal storage material has a thermal loading of the phase change material from 210 BTU to 840 BTU.

97. (New) The garment or material thereof of claim 25, wherein:
said thermal storage material comprises at least two layers of phase change materials with different transition temperatures; and
a transition temperature of an inner layer of said phase change material is greater than a transition temperature of an outer layer of said layer of phase change material which is adapted to be farther from a skin of the wearer than the inner layer.

98. (New) An article comprising a garment, an article of bedding, or material thereof for metabolic cooling and for insulation of a user in a cold ambient environment below a phase transition temperature of a thermal storage material, comprising:

a buffering thermal storage material capable of storing thermal energy as the latent heat of phase change located in the article;

said thermal storage material comprising a phase change material having at least one actual phase transition temperature between 41.9 and 94.1 degrees Fahrenheit; and

said thermal storage material has a thermal loading of phase change material from 1.22 BTU to 25.63 BTU per square foot of a surface area of the article.

99. (New) The article of claim 98, wherein the article comprises an article of bedding.

100. (New) The article of claim 98, wherein the article comprises a garment.

101. (New) An article comprising a garment, an article of bedding, or material thereof for metabolic cooling and for insulation of a user in a cold ambient environment below a phase transition temperature of a thermal storage material, comprising:

a buffering thermal storage material capable of storing thermal energy as the latent heat of phase change located in the article;

said thermal storage material comprising a phase change material having at least one actual phase transition temperature between 41.9 and 83.3 degrees Fahrenheit; and

said thermal storage material has a thermal loading of phase change material from 1.22 BTU to 73.1 BTU per square foot of a surface area of the article.

102. (New) The article of claim 101, wherein the article comprises an article of bedding.

103. (New) The article of claim 101, wherein the article comprises a garment.

104. (New) An article comprising a garment, an article of bedding, or material thereof for metabolic cooling and for insulation of a user in a cold ambient environment below a phase transition temperature of a thermal storage material, comprising:

a buffering thermal storage material capable of storing thermal energy as the latent heat of phase change located in the article;

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COPY said thermal storage material comprising a phase change material having at least one actual phase transition temperature between 41.9 and 94.1 degrees Fahrenheit; and

said thermal storage material has a thermal loading of phase change material from 12.33 BTU to 3360 BTU per cubic foot of a surface area of the article.

105. (New) The article of claim 104, wherein the article comprises an article of bedding.

106. (New) The article of claim 104, wherein the article comprises a garment.
